reflective matrix integrated within the spectral filter in order to improve contrast. For example, by extending the green, red (G,R) section of layer **60** under the blue, green B,G section of layer **70** and under the Blue (B) section of layer **70** all the colors are reflected from the overlap portion, reflecting white light and transmitting nothing so that the overlapping portion appears black. Similarly, the red (R) pixel in layer **60** is extended under the blue, green (B,G) pixel in layer **70**, a totally reflective black matrix is created at the overlapped portion., Using this architecture a black matrix is produced.

[**0337**] **FIG. 26** shows another stack of layers for producing colored light from both polarized and/or unpolarized white light **201**, similar to the stack in **FIG. 25**. The stack in **FIG. 26** has left handed cholesteric liquid crystals in layers **60** and **70** and right handed cholesteric liquid crystals in layer **65** and **75**. Although **FIG. 26** shows the stack producing a black matrix, it is understood from **FIGS. 11 and 13** that stack in **FIG. 26** can produce colored light with or without a black matrix for all the incident polarizations.

[**0338**] **FIG. 12A** shows a reflective filter display **130** having two layers. The first layer is a top layer **115** for having three sub-pixels, a sub-pixel **113** for reflecting blue, green, a sub-pixel **117** for reflecting blue and a clear isotropic sub-pixel **114**. The second layer is a bottom layer **125** having three sub-pixels, a sub-pixel **121** for reflecting red, green, a sub-pixel **127** for reflecting red and a clear isotropic sub-pixel **124**. To make left handed reflective cholesteric liquid crystal (CLC) color filter layer **115** reflecting blue, green in sub-pixel **113**, blue in sub-pixel **117** and having a clear sub-pixel **113**, first, prepare a bottom substrate **110** of PVA (polyvinyl alcohol) coated glass, by buffing it in one direction. Then, prepare a top substrate **112** of PET (Mylar D) by buffing it in any direction.

[**0339**] Mix a left handed CLC polymer comprising blue polysiloxane, such as that sold by Wacker Chemical Company of Germany as SLM 90032, 47.5% by weight, a left handed CLC polymer comprising blue polysiloxane, such as that sold by Wacker Chemical Company of Germany as SLM 90031, 19.1% by weight, with a low molecular weight nematic liquid crystal, such as that sold by EMI Company of Germany as (E44, EMI): 32.1% by weight. Then add a chiral dopant such as (S1011) sold by EMI and photo initiator (IG184) sold by Ciba-Geigy of US.A., 0.35% of the polymers. The above materials should be mixed at 120° C. and de-gassed in a vacuum for 20 minutes at 90° C.

[**0340**] The mixture is then coated onto the PVA coated glass bottom substrate **110** with the use of a knife coater. The coating is preferably about 8-12 microns thick. The coating temperature and the gap of the knife coater can be used to vary the thickness of the coating as applied.

[**0341**] The mixture is then laminated with the PET top substrate **112** using a laminator. The temperature and the gap between the rollers of the laminator will effect the final thickness of the film.

[**0342**] To make a CLC film with blue, green sub-pixel **113**, blue sub-pixel **117** and clear sub-pixel **113** in layer **115**, the layer **115** is heated at 75° C. with the PET substrate **112** up, the heating is preferably done on a hot plate.

[**0343**] With the layer **115** at 75° C. it is preferably mechanically sheared to align the liquid crystal molecules. Mechanical shearing provides a tangential mechanical force which helps align the liquid crystal molecules between substrates **110** and **112** in layer **115**.

[**0344**] With layer **115** still on the hot plate or still heated to 75° C., apply a mask to the top substrate layer **112** having the PET material. The mask will vary in size and shape depending on the use of the layer. For use in color displays the mask will be the size and shape of pixels used in the display. In the layer shown in **FIG. 3** the display uses two layers with three sub-pixels, two being reflective color filter portions per layer. Architectures for such displays are disclosed in the applicants' copending application attorney docket number PA1100 entitled "Cholesteric Liquid Crystal Reflective Color Filter Architectures", which is hereby made a part hereof and incorporated herein by reference.

[**0345**] A mask is applied to block the sub-pixels of the layer **115** to be the blue, green sub-pixel **113** and the clear sub-pixel **114** leaving exposed the blue sub-pixel **117**.

[**0346**] While still at 75° C. layer **115** is then exposed to UV light of 360 nm at 0.1 mW/cm^2 intensity for approximately 20 seconds to polymerize the exposed cholesteric liquid crystals in the blue sub-pixel **117** of layer **115**. While still at 75° C. layer **115** is further exposed at 75° C. with a collimated UV of about 360 nm at another intensity of about 10 mW/cm^2 for about 30 seconds.

[**0347**] While still at 75° C. the mask blocking the blue, green sub-pixel **113** is removed and layer **115** is exposed to UV light 360 nm at 0.1 mW/cm^2 for approximately 40 seconds to polymerize the blue, green sub-pixel **113** of layer **115** with the desired bandwidth.

[**0348**] While still at 75° C. layer **115** is further exposed at 75° C. with a collimated UV of about 360 nm at another intensity of about 10 mW/cm^2 for about 30 seconds.

[**0349**] The mask is then totally removed exposing all of layer **115**.

[**0350**] The temperature is raised to 150° C. to polymerize the clear isotropic phase sub-pixel **114**.

[**0351**] Maintaining 150° C. layer **115** is then exposed to UV light of 360 nm at 20 mW/cm^2 for approximately 30 seconds to set the polymers.

[**0352**] The PET substrate **112** is then removed. Layer **115** is now ready for installation in a display or for other use.

[**0353**] To make left handed reflective cholesteric liquid crystal (CLC) color filter layer **125** reflecting red, green broadband light in sub-pixel **121**, red in sub-pixel **127** and having a clear isotropic sub-pixel **124**, first, prepare a bottom substrate **120** of PVA (polyvinyl alcohol) coated glass, by buffing it in one direction. Then, prepare a top substrate **122** of PET (Mylar D) by buffing it in any direction.

[**0354**] Mix a left handed CLC polymer comprising blue polysiloxane, such as that sold by Wacker Chemical Company of Germany as SLM 90032, 63% by weight, with a low molecular weight nematic liquid crystal, such as that sold by EMI Company of Germany as (E44, EMI): 28.6% by weight. Then add a low molecular nematic liquid crystal such as (TEB30) sold by SLICHEM of China, 8.4% by weight, and photo initiator (IG184, CibaGeigy), 0.35% of the liquid crystal polymer. The above materials are mixed at 120° C. and de-gassed in a vacuum for 20 minutes at 90° C.